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THE VOLUME OF PRODUCTION OF BASIC MATERIALS IN THE UNITED STATES, 1909-21

EDMUND E. DAY

GENERAL CONCLUSIONS FOR THE YEARS 1919-21

THAT violent fluctuations of production have marked the past two or three years is generally recognized. But just how great these fluctuations have been is not commonly known. Yet accurate information on this point is of distinct importance, for these have been years of radical change in the price level and extraordinary realignment in demand and supply. Accurate measurement of changes in the volume of production since 1919 should contribute much to an understanding of the factors underlying current business conditions. Such measurement of output is afforded by the several indices which follow.

The basic materials of modern commercial life have their origin in four divisions of economic activity: agriculture, animal husbandry, forestry, and mining.[1] The conditions of production in these four divisions are so dissimilar as to suggest a separate index for each. The separate indices may then be combined to form an index of the production of all basic materials.

For a number of reasons, 1919 is the best recent year with which to make comparison. This is true despite the fact that mineral production in 1919 was low — a fact to be taken into account in interpreting the most recent data of mine output. In most other lines 1919 production was reasonably normal. Certainly no other year since the war serves as well as a base from which to measure subsequent fluctuations.

Suppose, then, that 1919 production in each major division of economic activity is taken as 100. On this basis, production in 1920 and 1921 assumed the proportions shown in the following table:

	1919	1920	1921
Agriculture	100	109.2	90.7
Animal husbandry	100	92.4	95.4
Forestry	100	97.8	85.4
Mining	100	114.5	90.4
All basic materials	100	103.2	92.2

It appears that production in 1920 was somewhat greater than in 1919 — notably greater in mining and agriculture. The only major division of production that fell in 1920 decidedly below 1919 was animal husbandry. In 1921, upon the other hand, the output of all lines of basic material was below the volume of 1919. Forestry presented the most extreme case of decline, but agriculture and mining also showed marked contractions. Taking all basic materials into account, the volume of production appears to have been 3.2 per cent higher in 1920, and 7.8 per cent lower in 1921, than in 1919,

Agriculture and mining are of such fundamental importance, and the fluctuations of production in both have been during the past two or three years so extreme, that it seems desirable to measure the extent to which production in these lines has deviated from normal proportions. Normal in this connection is to be determined on the basis of the trend of production over a considerable period of years — good and bad years alike being included. Both agriculture and mining show a persistent expansion of volume over at least the period of the past twenty-three years. Defining normal, then, in terms of the observed trends from 1899 to 1921, it is found that the percentage of actual to normal production in agriculture and mining during each of the past three years has run as follows:

	1919	1920	1921
Agriculture	99.4	107.3	87.9
Mining	93.4	104.0	80.0

The year 1919 was a season of normal agricultural output, but a year in which mineral production fell substantially below normal proportions. The year of the peak of the post-war boom, 1920, was featured by agricultural and mineral production distinctly above normal levels. In contrast, the year of depression, 1921, witnessed a slump in production in each of these major lines for which there are few precedents in the economic history of the country, and possibly no precedent when the two are considered in combination.

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[1] The term agriculture is commonly used to include animal husbandry, with the exception of fisheries. It seems preferable, however, in this study to consider animal products in a separate category.

Doubtless the extraordinarily low volume of production in 1921 was primarily the consequence of the drastic deflation which featured the preceding months. In other words, price reductions during 1920 and 1921 were so radical as to eliminate the spur of profit from many lines of production. Operations in both agriculture and mining were consequently greatly reduced. The unusual violence and magnitude of both the price change and the contraction of output have an important bearing upon the speed with which the business world may reasonably expect to restore normal conditions. The present upward tendency of prices is in natural sequence with the price and production movements of 1921, and presumably has been in some measure stimulated by the extraordinary extent to which production in 1921 fell below normal levels. The vital significance of the course of physical production justifies a more detailed examination of the available data for recent years. Such an examination is undertaken in the succeeding sections of this paper.

TABLE A. — UNADJUSTED INDICES OF PHYSICAL PRODUCTION FOR AGRICULTURE, ANIMAL HUSBANDRY, AND FORESTRY 1909–21

(*1919 = 100. Unit: one per cent*)

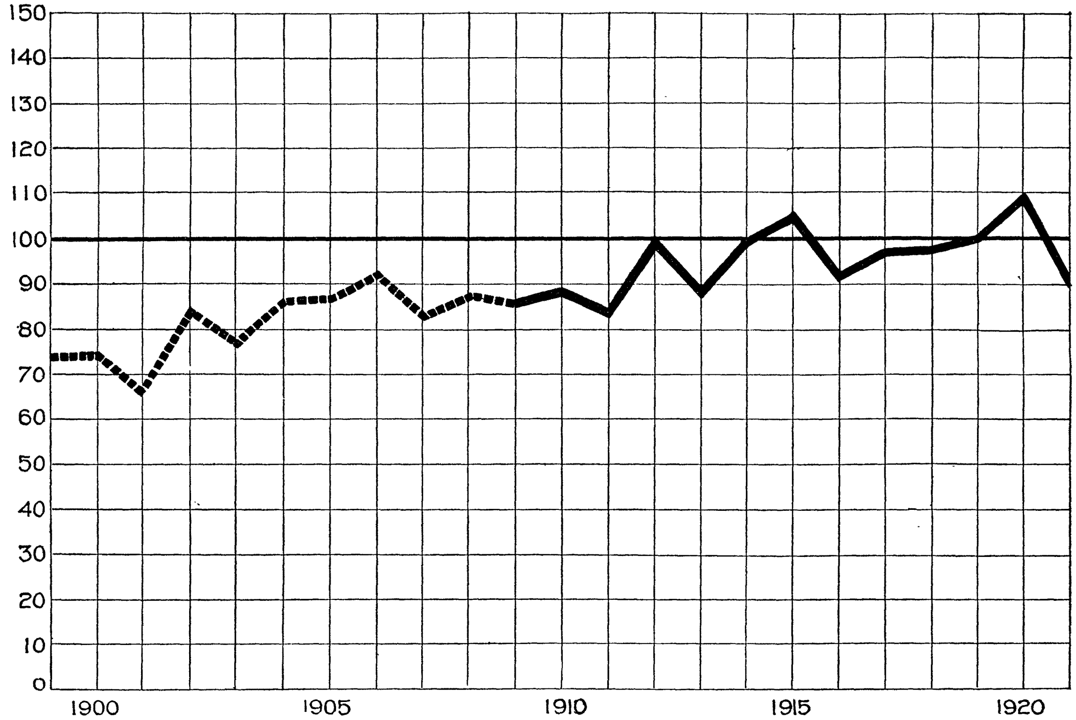
Year	Agriculture (crops)	Cereals	Vegetables	Fruits	Food crops	Feed crops	Animal husbandry	Forestry
1909	**86.0**	84.6	106.6	90.5	80.3	90.3	**82.8**	**128.8**
1910	**88.5**	88.4	96.9	95.8	75.0	93.1	**75.0**	**115.8**
1911	**83.8**	79.0	82.5	114.7	73.9	78.7	**87.0**	**107.1**
1912	**99.6**	99.0	110.7	133.4	88.6	103 1	**84.3**	**113.3**
1913	**88.4**	85.2	92.7	93.1	83.4	84.2	**83.9**	**111.1**
1914	**99.5**	93.7	109.0	140.7	99.9	91.8	**80.2**	**108.1**
1915	**104.9**	109.0	104.0	139.2	108.3	108.4	**85.9**	**107.1**
1916	**91.6**	85.0	85.5	113.0	77.2	98.0	**93 3**	**115.2**
1917	**97.5**	96.8	125.1	96.2	81.3	107.2	**92.9**	**103.7**
1918	**98.1**	97.7	119.4	101.0	100.6	94.9	**102.9**	**92.3**
1919	**100.0**	100.0	100.0	100.0	100.0	100.0	**100.0**	**100.0**
1920	**109.2**	106.5	121.4	133.2	101.3	110.8	**92.4**	**97.8**
1921	**90.7**	97.0	106.3	74.0	86.4	100.3	**95.4**	**85.4**

UNADJUSTED INDICES, 1909–21

Agriculture. The physical volume of agricultural production during recent years has been registered in the reported totals of our principal crops. The index for agriculture rests upon the following: corn, cotton, hay, wheat, oats, barley, rye, rice, white potatoes, sweet potatoes, sugar beets, apples, peaches, oranges, and tobacco. The index refers production to the base of 1919 = 100, and has been computed for the period 1909–21 inclusive. It is shown numerically in Table A and graphically in Chart 1. For purposes of comparison, a similar index for 1899–1908 (presented in the September 1920 issue of this REVIEW) is also included in the chart. The index discloses in clear outline the irregular fluctuations characteristic of agricultural production. The steady upward trend of the index is obvious, but from year to year decided alterations of volume are recurrent. The high production of 1912, 1915, and 1920 is a conspicuous feature of the chart. It is surprising to find the results of the war years 1916–18 barely maintaining the normal expansion of agriculture in this country. The output of 1921 declines to a markedly low level.

The major crops of the United States fall naturally into a number of distinct groups. There are cereal, vegetable, fruit, and miscellaneous crops (such as cotton and tobacco). On a somewhat different basis, most of the principal crops may be thrown into two groups: those used primarily as food for human consumption, and those fed largely to live stock and poultry. Because of the interest attached to these different groupings, it has seemed desirable to construct several subordinate indices of agricultural pro-

CHART 1. — UNADJUSTED INDEX OF PHYSICAL PRODUCTION FOR AGRICULTURE (CROPS), 1899–1921
(*1919 = 100*)



duction. These subordinate indices represent the following groups:

Cereals:	Corn, wheat, oats, barley, rye, rice
Vegetables:	White potatoes, sweet potatoes
Fruits:	Apples, peaches, oranges
Food crops:	Wheat, rice, white potatoes, sweet potatoes, sugar beets, apples, peaches, oranges
Feed crops:	Hay, corn, oats, barley, rye

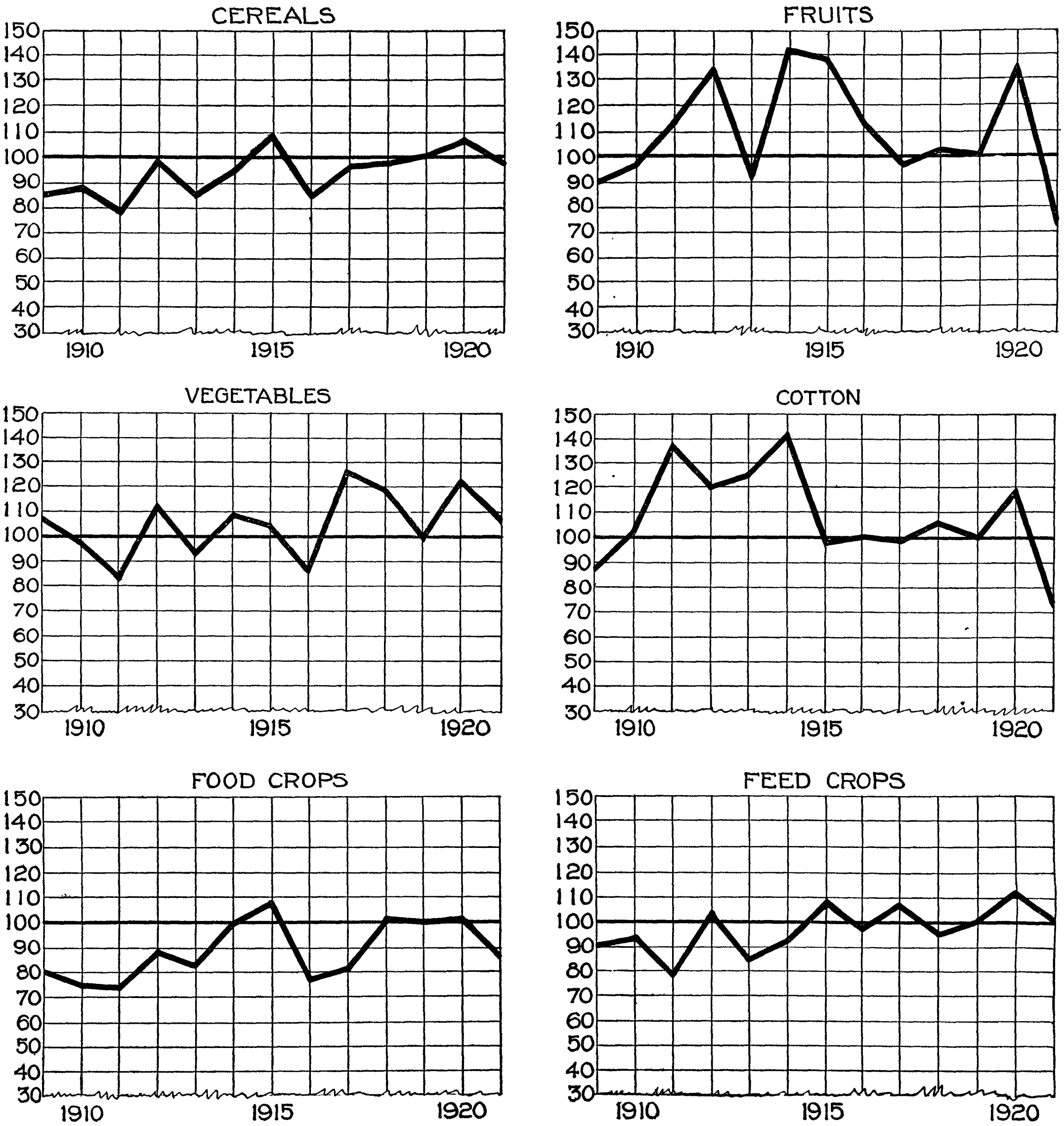
The subordinate indices are given in full in Table A and Chart 2. They present many striking contrasts. In addition to the group indices, the chart includes a diagram showing the relative fluctuations of the cotton crop since 1909. This highly important fibre crop falls outside the groups for which indices have been computed, and exhibits fluctuations quite unlike those of any other important agricultural product. It is consistent with the others, however, in its extremely low volume in 1921.

Animal husbandry. The index of the physical volume of production for animal husbandry is based upon eight series giving the annual production in the United States of cattle, calves, whole milk, hogs, sheep, wool, poultry, and eggs. The series for milk, poultry, and eggs are not available for the years before 1914; otherwise the data are complete from 1899 to date. The index is given in full in Table A and Chart 3. A comparison of the index for animal husbandry with that for agriculture shows that the fluctuations from year to year are not as extreme. This is, of course, as one might expect. Apparently the war stimulated production of animal products relatively more than it did crops. It is noteworthy, also, that production in animal husbandry was maintained upon a higher level in 1921 than in any other important division. Possibly this is to be accounted for by the exceptionally low prices prevailing for feed during 1920 and 1921.

Forestry. Forestry constitutes the least important of the four divisions considered in this study, but nevertheless is of sufficient significance to justify a separate index. A single series serves to register the course of production of forest products from 1909 to date. This is the series of total lumber cut in the United States. The items of this series, reduced to percentages of the 1919 cut, constitute the group index. The index is presented in Table A and Chart 4. A striking feature of the index is its general downward trend. It offers unmistakable evidence of the steady depletion of our forest resources. Incidentally, it shows production in 1921 only 85.4 per cent of production in 1919.

Chart 2 — Unadjusted Indices of Physical Production for Groups of Crops, 1909–21

(1919 = 100)



Mining. The index for mining is based upon the records of production of the following minerals: iron, copper, lead, zinc, gold, silver, bituminous coal, anthracite, petroleum, natural gas, stone, sand, and cement. The index appears in Table B, and is presented graphically in Chart 6. It discloses a larger proportionate increase from 1909 to 1919 than is shown by any of the other lines of production. Furthermore, the expansion of output during the war was much greater than in other lines. The fluctuations of the business cycle are much more clearly discernible in mining than in agriculture. Mining was much stimu-

Chart 3. — Unadjusted Index of Physical Production for Animal Husbandry, 1909–21

(*1919 = 100*)

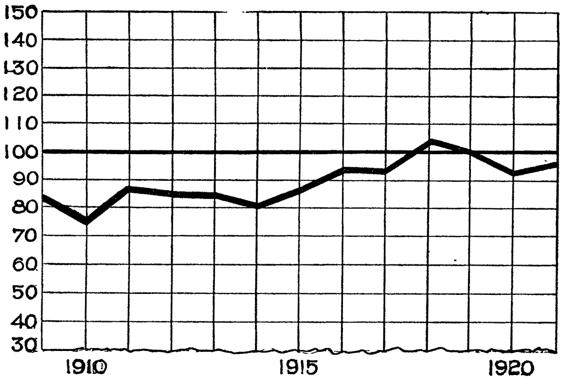


Chart 4. — Unadjusted Index of Physical Production for Forestry, 1909–21

(*1919 = 100*)

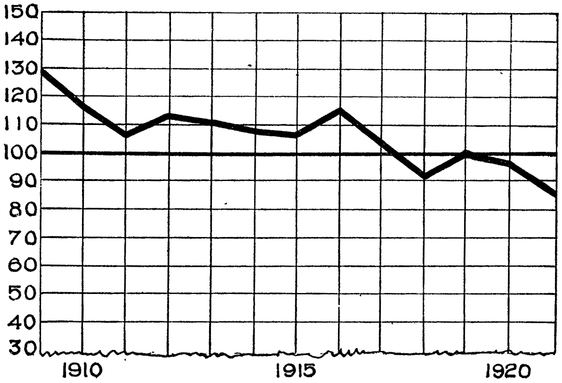


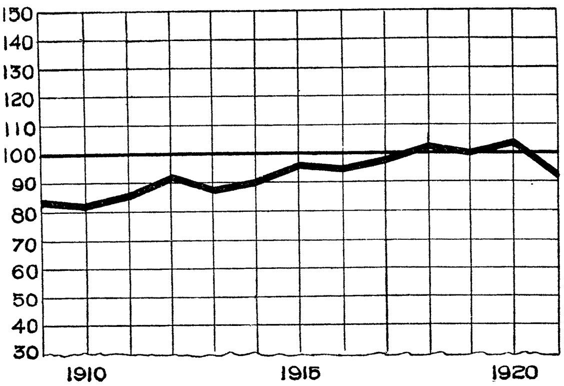
Table B. — Unadjusted Indices of Physical Production for Mining, and for Agriculture, Animal Husbandry, Forestry and Mining Combined, 1909–21

(*1919 = 100. Unit: one per cent*)

Year	Mining	All metals	Industrial metals	Precious metals	All non-metals	Fuels	Building materials	Agriculture, animal husbandry, forestry and mining combined
1909	**74.3**	92.2	84.2	125.4	71.1	69.8	89.5	**83.4**
1910	**81.7**	97.0	88.9	130.9	78.8	77.2	105.0	**82.6**
1911	**81.0**	87.4	77.8	130.2	79.8	78.2	104.2	**84.8**
1912	**86.7**	103.3	96.2	131.4	83.6	82.1	107.8	**91.7**
1913	**93.0**	104.9	98.2	131.3	90.7	88.7	123.1	**87.8**
1914	**88.1**	91.6	80.8	141.1	87.4	85.4	120.4	**90.2**
1915	**94.1**	112.4	103.7	148.4	90.6	88.9	116.7	**95.7**
1916	**105.5**	141.2	141.1	141.6	99.3	97.4	130.2	**94.8**
1917	**113.0**	136.8	138.2	132.4	108.5	107.7	119.7	**98.3**
1918	**113.5**	130.0	134.1	116.8	110.4	111.5	96.3	**102.2**
1919	**100.0**	100.0	100.0	100.0	100.0	100.0	100.0	**100.0**
1920	**114.5**	103.8	108.0	90.7	116.9	116.7	119.8	**103.2**
1921	**90.4**	51.0	44.2	83.5	101.9	101.7	105.2	**92.2**

Chart 5. — Unadjusted Index of Physical Production for All Basic Materials, 1909–21

(*1919 = 100*)

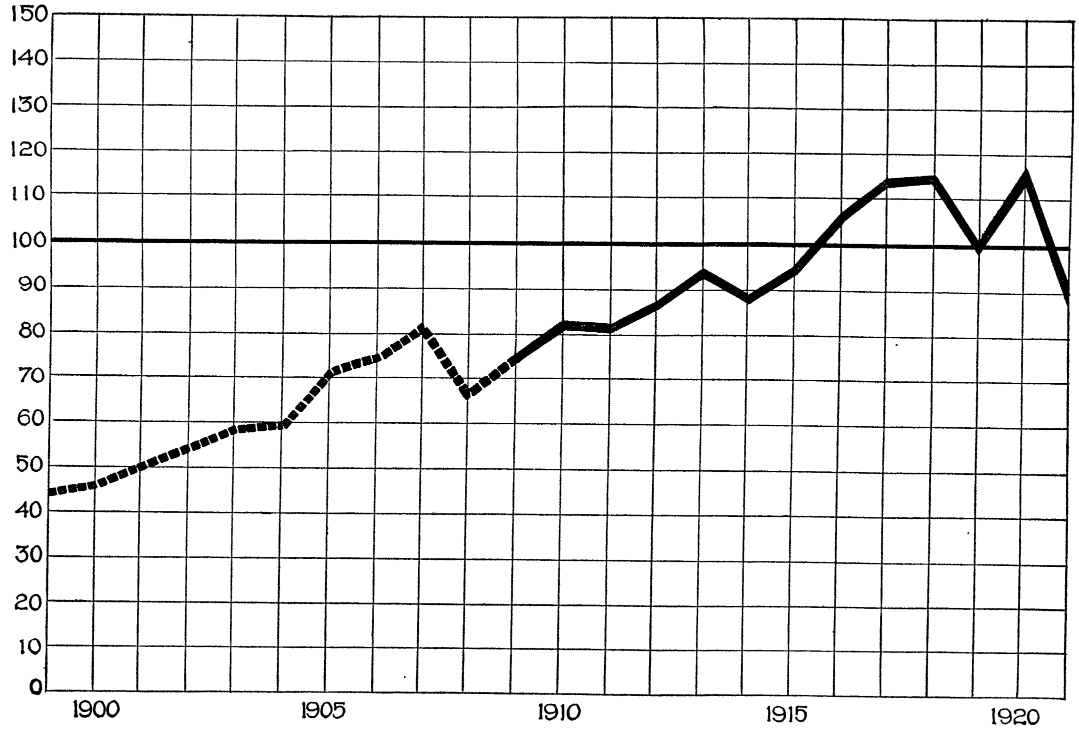


lated by the post-war boom of 1920, and the unadjusted index for that year rose to 114.6. Similarly, mining was much influenced by the depression of 1921, output in that year declining to 90.6 per cent of the volume of 1919.

The mineral products upon which the index for mining is based fall into several distinct categories. Thus, for some purposes the metals are to be distinguished from the non-metals. The metals in turn may be subdivided into those primarily consumed in industry — iron, copper, lead, and zinc — and those generally classified as precious — gold and silver. The fuels — coal, petroleum and natural gas — constitute the most important non-metal group; in fact, the

CHART 6. — UNADJUSTED INDEX OF PHYSICAL PRODUCTION FOR MINING, 1899–1921

(*1919 = 100*)



most important of all mineral groups. Other non-metals — stone, sand, and cement — are important primarily as building materials. Subordinate indices have been constructed for all of these groups. The indices are given numerically in Table B and graphically in Chart 7. The differences disclosed among the several groups are striking. Thus, the index for industrial metals shows a conspicuous bulge during the period of the war and falls to the extraordinarily low figure of 44.2 in 1921. The production of precious metals fell off one-third between 1915 and 1919. In contrast, production of fuels and building materials has shown a strong upward tendency throughout the period since 1909. The index for fuels maintains the steadiest course; that for building materials naturally discloses a marked slump in 1918 and 1919, when building operations fell to abnormally low levels. In general, the output of non-metals differs from other important lines in exhibiting no conspicuous contraction in 1921.

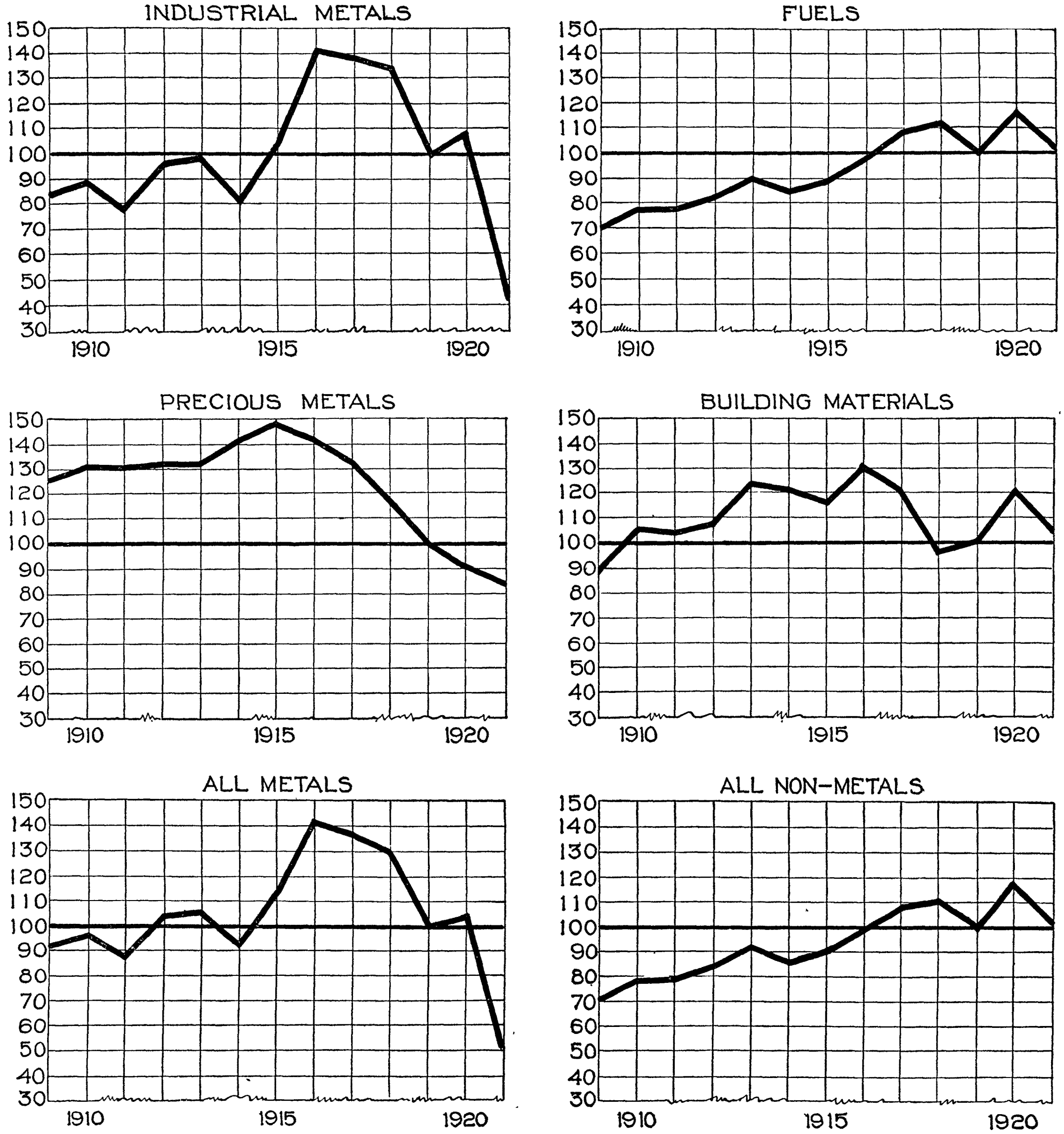
All basic materials. Having obtained separate indices for agriculture, animal husbandry, forestry, and mining, it seems desirable to combine the four into an index of the physical volume of production for all basic materials. Such a combined index is given in Table B and Chart 5. Naturally the fluctuations of this combined index are confined within much narrower limits than those of any of the constituent indices — deficiencies and surpluses in the different lines tend to offset one another. It is noteworthy, however, that production in 1921 seems to have fallen much more seriously below the general trend of the index than in any other year of the period covered.

ADJUSTED INDICES, 1909–21

Agriculture and Mining. The indices described in the previous section have all expressed output as a percentage of production in the base year, 1919. For many purposes comparison needs to be made, not with the level of the base year, but with an estimated normal volume of production for each successive year. Measurement of production on this basis requires an index adjusted to the trend of output over a con-

CHART 7. — UNADJUSTED INDICES OF PHYSICAL PRODUCTION FOR GROUPS OF MINERALS, 1909–21

(*1919 = 100*)



siderable number of years. An earlier study analyzed the physical volume of agricultural and mineral production for a substantial period prior to 1909. With the results of this earlier study in hand, it is practicable to offer at this time adjusted indices for agriculture and mining for the period 1909–21. In each case, the trend is based upon the full period of twenty-three years. The two adjusted indices appear in Table C, below. They are presented graphically in Charts 8 and 9. The two charts disclose highly significant differences. Clearly, the deviations from normal production exhibited by agriculture are much more erratic and uncertain than those shown by mining. In the adjusted index for mining the course of the business cycle is plainly observable. It is interesting to note that despite the marked differences of the two indices, both rose substantially above 100 in 1920 and fell far below 100 in 1921. In the latter year agricultural production was only about 88 per cent, and mineral production only 80 per cent, of normal.

TABLE C. — ADJUSTED INDICES OF PHYSICAL PRODUCTION FOR AGRICULTURE AND MINING

(*Normal = 100. Unit: one per cent*)

Year	Agriculture (crops)	Mining
1899	98.4	93.0
1900	97.3	92.4
1901	84.9	94.5
1902	106.3	95.5
1903	96.8	99.7
1904	105.2	95.8
1905	104.8	108.3
1906	109.9	108.8
1907	97.2	114.2
1908	101.3	91.1
1909	98.1	96.5
1910	99.4	102.1
1911	92.8	97.6
1912	108.7	100.8
1913	95.2	104.5
1914	105.7	95.8
1915	110.0	98.9
1916	94.7	107.5
1917	99.5	111.8
1918	98.8	109.0
1919	99.4	93.4
1920	107.3	104.0
1921	87.9	80.0

METHODS AND MATERIALS

The methods employed in the present study follow closely those devised in the construction of the indices of physical production presented in the issues of this REVIEW from September 1920 to January 1921. The adjusted indices are weighted geometric means of relatives obtained by reducing the data of actual production to percentages of the corresponding items of the base period. The weights, as in the earlier study, are proportional to aggregate values in the base years. The adjusted indices have been obtained from the unadjusted by the short-cut method.[1]

While no change has been made in the methods previously employed, there has been an attempt to broaden the scope of the indices. By taking only the years from 1909 on, instead of the much longer periods covered in the earlier analysis, it has been possible to add a considerable number of series. Thus in the case of agriculture, sweet potatoes and the three principal fruits — apples, peaches, and oranges — have been brought into the analysis. In the case of mining, natural gas, stone, sand, and cement are now included, though not before. Furthermore, it has been possible to construct independent indices for animal husbandry and forestry. In its present form, the study is a thoroughly comprehensive investigation of the physical volume of production for practically all the more important basic materials.

The series from which the several indices have been derived are given in full in Tables I, K, M, O, and Q. (See pages 226–230.) Three or four series which are not of sufficient importance to include in the indices are entered in the tables because affording interesting comparisons. Such are the series showing production of bauxite, platinum, and lime. The sources of series not included in the earlier study are indicated in connection with the tables. For the sources of the remainder of the material, reference should be made to the REVIEW OF ECONOMIC STATISTICS for September and October, 1920. One important series is not included in the tables of original items appearing on the pages mentioned. This is the series showing lumber cut in the United States, as follows:

TABLE D. — LUMBER CUT IN THE UNITED STATES

Year	Total quantity mill. ft. board measure
1909	44,510
1910	40,018
1911	37,003
1912	39,158
1913	38,387
1914	37,346
1915	37,012
1916	39,807
1917	35,831
1918	31,890
1919	34,552
1920	33,799
1921	29,500

The items of this series from 1909 to 1919 are to be found in the Bulletin of the Bureau of the Census on "Lumber, Lath, and Shingles" (14th Census of the United States). The figure for 1920 — 33,798,800,000 board feet — is an estimate of the United States Forest Service (cited in *American Lumberman*, January 14, 1922, p. 29). The 1921 item has been obtained from an estimate by Charles S. Keith, published in the *American Lumberman*, December 17, 1921, p. 35. Mr. Keith estimates 1921 production at 28,000,000,000 feet board measure on the basis of a calculation that the total cut of the previous year was 32,000,000,000. Since the Forest Service has more recently estimated the 1920 cut at 33,799,000,000, Mr. Keith's estimate has been proportionately increased.

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[1] Explained in the REVIEW of December, 1920, pp. 363, 364 (Reprint, pp. 59, 60).

CHART 8. — ADJUSTED INDEX OF PHYSICAL PRODUCTION FOR AGRICULTURE, 1899–1921
(*Normal = 100*)

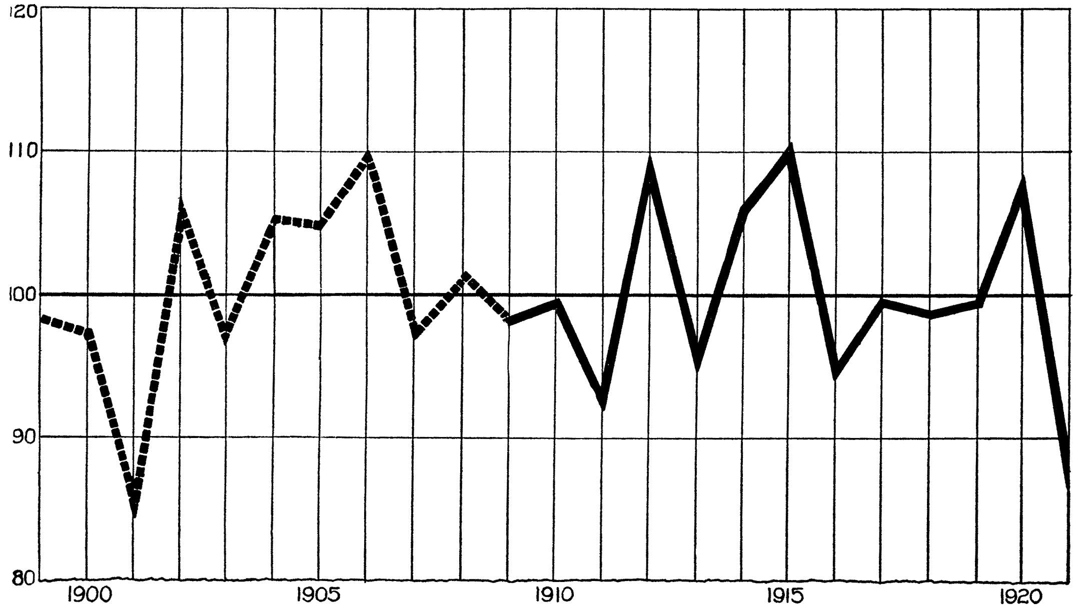
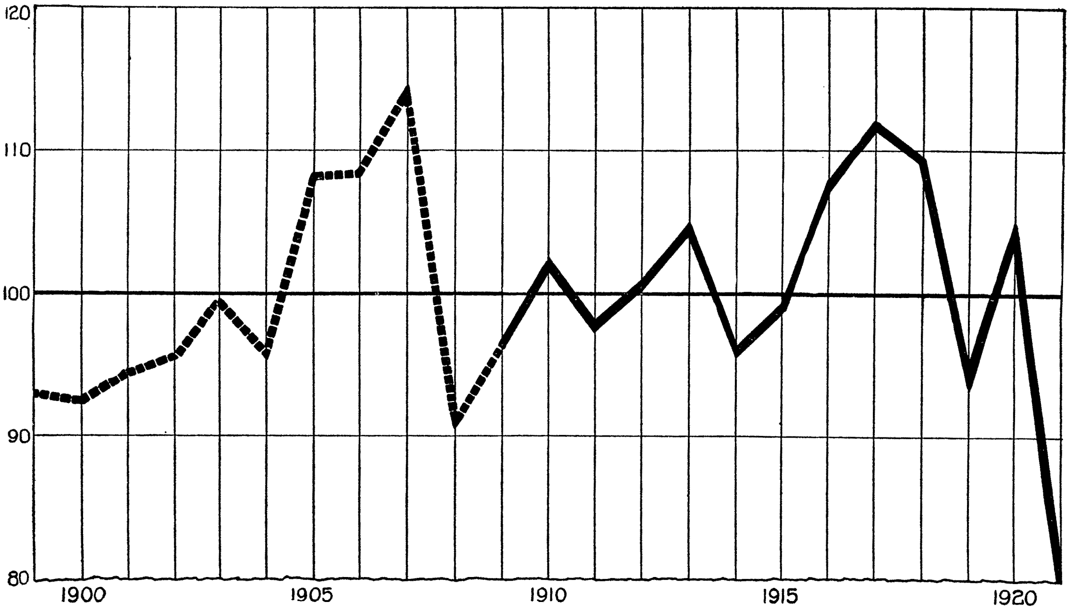


CHART 9. — ADJUSTED INDEX OF PHYSICAL PRODUCTION FOR MINING, 1899–1921
(*Normal = 100*)



The first step in the construction of the indices involves the reduction of the original items to percentages of the corresponding figures of the base period.[1] For the indices of animal husbandry, forestry, and mining, the year 1919 has been taken as the base. This is desirable, if for no other reason, because 1919 is the year for which we have the complete data of our most recent census of manufactures, and a comparison with manufacturing output will have later to be made. In the case of agriculture, however, the use of a single year as a base has not seemed wise owing to the erratic fluctuations of volume which feature the cultivation of our principal crops. To stabilize the relatives of agricultural production, therefore, these were computed on the base of the average production of 1919 and 1920. The relatives of annual production for all series on the bases indicated are given in full in Tables J, L, N, P, and R. (See pages 226–230.)

Perhaps the chief difficulty encountered in the construction of indices of physical volume is the weighting of the different constituent series. In the case of agriculture, the several crops were weighted on the basis of the average of their aggregate values in 1919 and 1920. The aggregate values of the several crops for 1919 and 1920, and for the average of these two years, appear in the following table, the corresponding weights being shown in a parallel column:

TABLE E. — AGGREGATE VALUES AND PROPORTIONATE WEIGHTS OF AGRICULTURAL PRODUCTS IN 1919 AND 1920

Crops	Aggregate Values (*in millions of dollars*)			Proportionate weights (average 1919–1920)
	1919	1920	Average 1919–1920	
Wheat	2080.1	1197.3	1638.7	15.0
Rice	111.9	62.0	87.0	.8
White potatoes	514.9	461.8	488.3	4.5
Sweet potatoes	130.5	117.8	124.1	1.1
Sugar beets	75.4	99.4	87.4	.8
Apples	260.9	256.7	258.8	2.4
Peaches	100.5	96.0	98.2	.9
Oranges	60.2	64.9	62.6	.6
Hay	2037.7	1758.4	1898.0	17.4
Corn	3780.6	2150.3	2965.4	27.1
Oats	833.9	688.3	761.1	7.0
Barley	178.1	135.1	156.6	1.4
Rye	100.6	76.7	88.6	.8
Tobacco	570.9	335.7	453.3	4.2
Cotton	2034.7	933.7	1484.2	13.6
Cottonseed	368.6	155.2	261.9	2.4
Total	13239.5	8589.3	10914.3	100.0

The problem of weighting the series included in the index of animal husbandry was somewhat more complicated. True, aggregate values for milk, poultry, and eggs are reported by the Department of Agriculture (see *Weather, Crops and Markets*, May 13, 1922, p. 421); and the value of the 1919 wool clip has been obtained fairly readily through the use of the Tariff Commission's conclusions concerning average wool prices in that year. On the basis of these prices and the reported total of the wool clip, the aggregate value of wool produced in 1919 has been calculated at $150,000,000.[2] Estimates of the value of live stock, however, are not directly obtainable. The values employed in the construction of the index for animal husbandry have been estimated from the reported cost of materials consumed in the slaughtering and meat-packing industry in 1919. This industry purchased materials — practically all live stock — in the following amounts:

Cattle	$1,056,000,000
Calves	96,000,000
Hogs	1,757,000,000
Sheep and lambs	147,000,000

It is calculated that the slaughtering and meat-packing industry accounts for about two-thirds of the cattle and hogs slaughtered, two-fifths of the calves, and five-sixths of the sheep and lambs. The aggregate value of all live stock slaughtered has been found, therefore, by assuming that the different varieties killed in the slaughtering and meat-packing industry bear these proportions to their respective totals.[3] A complete set of the estimated aggregate values of the various animal products in 1919 is shown in Table F.

The principal difficulty encountered in obtaining aggregate values for mineral production in 1919 has to do with the elimination of values produced by processes which are best classified as manufacture. Thus the production of pig iron

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[1] Where items are lacking, figures have been interpolated by assuming the link relatives of the missing items to be equal to the average link relatives of the series in the same group for which data are in hand.

[2] I am indebted to Mr. Mark A. Smith, associated with the Tariff Commission, for this estimate.

[3] Of course, in the cost of live stock for the slaughtering trade, certain shipping charges are included, but it is thought that these hardly more than compensate for omissions elsewhere in the enumeration.

TABLE F. — AGGREGATE VALUES AND PROPORTIONATE WEIGHTS OF ANIMAL PRODUCTS IN 1919

Products	Aggregate values (*in millions of dollars*)	Proportionate weights
Cattle	1584	17.7
Calves	240	2.7
Milk	3055	34.1
Hogs	2636	29.5
Sheep and lambs	176	2.0
Wool	150	1.7
Poultry	417	4.7
Eggs	683	7.6
Total	8941	100.0

from iron ore is usually included among the products of manufacture in this country. To be consistent, the costs of similar processes in the extraction and refining of other metals should be subtracted in estimating the aggregate value of mineral products. To effect this end, recourse has been had to the data of the 1919 Census of Manufactures in which the cost of smelting and refining ore is specifically reported. A similar problem arises in the case of cement. In Table G below, the steps by which aggregate values for the various mineral products have been obtained are indicated. It should be stated, however, that no means have been discovered for eliminating the cost of extracting and refining in the case of the precious metals. As a consequence, these have a somewhat greater weight in the mining index than they should have. The index is not appreciably affected, however, by this slight inconsistency.

TABLE G. — AGGREGATE VALUES AND PROPORTIONATE WEIGHTS OF MINERAL PRODUCTS IN 1919

Products	AGGREGATE VALUES (*in millions of dollars*)			Proportionate weights
	Reported gross values	Cost of extracting and refining	Net values	
Iron ore	....	....	197.3	6.1
Copper	239.3	66.7	172.6	5.4
Zinc	66.0	34.1	31.9	1.0
Lead	45.0	17.4	27.6	.9
Gold	....	....	60.3	1.9
Silver	....	....	63.5	2.0
Bituminous coal	....	....	1170.0	36.5
Anthracite	....	....	364.9	11.4
Petroleum	....	....	775.0	24.1
Natural gas	....	....	162.0	5.0
Stone	....	....	96.7	3.0
Sand	....	....	46.0	1.4
Cement	138.1	95.8	42.3	1.3
Total	....	....	3210.1	100.0

The aggregate values used in constructing the combined index for all basic materials were not derived by the summation of the values of the several constituents in the four different divisions. Instead, figures were obtained for each of the groups as a whole. In the case of agriculture and animal husbandry, aggregate values were secured from the *Monthly Crop Reporter* of August, 1921 (p. 96). In connection with the figures there published, it is stated that one-third of the farm value of crops is really represented in animal products, since about this proportion of the crops in this country is regularly fed to stock. The total value of the crops, consequently, has been reduced one-third in joining the indices for agriculture and animal husbandry in the index for all basic materials. The aggregate value for forest products for 1919 has been approximated by taking the cost of materials reported for the lumber industry in the 1919 Census of Manufactures. For mining, as previously stated, 1919 was a subnormal year. Not only was production low, but the level of prices for mine products was considerably under that of products of farm and forest. It has been thought, therefore, that if mining were given merely a weight corresponding to the aggregate value of its products for 1919, its relative importance would be seriously understated. For this reason the estimated aggregate value of minerals in 1919 has been arbitrarily raised 15 per cent. The total values

TABLE H. — AGGREGATE VALUES AND PROPORTIONATE WEIGHTS OF FOUR MAJOR GROUPS IN 1919

Groups	Aggregate values (*in millions of dollars*)	Proportionate weights
Agriculture	10650.0	44.3
Animal husbandry	8950.0	37.2
Mining	4000.0	16.6
Forestry	450.0	1.9
Total	24050.0	100.0

for 1919 obtained by these methods for agriculture, animal husbandry, forestry, and mining, appear in Table H, above. The corresponding weights, shown in the right-hand column, are those employed in the construction of the combined index for all basic materials.

TABLE I. — ANNUAL PHYSICAL PRODUCTION OF AGRICULTURAL PRODUCTS, 1909–21 —CROPS

Year	Wheat	Rice	White potatoes	Sweet potatoes	Sugar beets	Apples	Peaches	Oranges
	million bu.	*million bu.*	*million bu.*	*million bu.*	*thousand tons*	*million bu.*	*million bu.*	*million boxes*
1909..............	700.4	24.37	394.6	59.23	3933	146.1	35.47	19.29
1910..............	635.1	24.51	349.0	59.94	4047	141.6	48.17	....
1911..............	621.3	22.93	292.7	54.54	5062	214.0	34.88	....
1912..............	730.3	25.05	420.6	55.48	5224	235.2	52.34	....
1913..............	763.4	25.74	331.5	59.06	5886	145.4	39.71	....
1914..............	891.0	23.65	409.9	56.57	5585	253.2	54.11	....
1915..............	1025.8	28.95	359.7	75.64	6511	230.0	64.10	21.20
1916..............	636.3	40.86	287.0	70.96	6228	193.9	37.50	24.43
1917..............	636.7	34.74	442.1	83.82	5980	166.7	48.76	10.59
1918..............	921.4	38.61	411.9	87.92	5949	169.6	33.09	24.20
1919..............	968.0	41.98	322.9	97.13	6421	142.1	53.18	22.53
1920..............	833.0	52.07	403.3	103.92	8546	223.7	45.62	29.70
1921..............	794.9	35.10	346.8	98.66	7678	96.9	32.73	30.70

SOURCES: Data for sweet potatoes, sugar beets, apples, peaches and oranges for 1909–18 were obtained from the Yearbook of the Department of Agriculture 1920; 1919–21 data from the *Monthly Crop Reporter*, December, 1921.

TABLE J. — RELATIVE ANNUAL PHYSICAL PRODUCTION OF AGRICULTURAL PRODUCTS, 1909–21 — CROPS

(*Average of 1919 and 1920 = 100. Unit: one per cent*)

Year	Wheat	Rice	White potatoes	Sweet potatoes	Sugar beets	Apples	Peaches	Oranges
Base:	*million bu.*	*million bu.*	*million bu.*	*million bu.*	*thousand tons*	*million bu.*	*million bu.*	*million boxes*
1919–20 (average)	900.5	47.02	363.1	100.52	7484	182.9	49.40	26.12
1909..............	77.8	51.8	108.7	58.9	52.6	79.9	71.8	73.8
1910..............	70.5	52.1	96.1	59.6	54.1	77.4	97.5	....
1911..............	69.0	48.8	80.6	54.3	67.6	117.0	70.6	....
1912..............	81.1	53.3	115.8	55.2	69.8	128.6	105.9	....
1913..............	84.8	54.7	91.3	58.8	78.6	79.5	80.4	....
1914..............	99.0	50.3	112.9	56.3	74.6	138.4	109.5	....
1915..............	113.9	61.6	99.1	75.2	87.0	125.7	129.7	81.2
1916..............	70.7	86.9	79.0	70.6	83.2	106.0	75.9	93.5
1917..............	70.7	73.9	121.7	83.4	79.9	91.1	98.7	40.5
1918..............	102.3	82.1	113.4	87.5	79.5	92.7	67.0	92.7
1919..............	107.5	89.3	88.9	96.6	85.8	77.7	107.6	86.3
1920..............	92.5	110.7	111.1	103.4	114.2	122.3	92.3	113.7
1921..............	88.3	74.6	95.5	98.2	102.6	53.0	66.2	117.5

TABLE K.—ANNUAL PHYSICAL PRODUCTION OF AGRICULTURAL PRODUCTS, 1909–21—CROPS (Continued)

Year	Hay	Corn	Oats	Barley	Rye	Tobacco	Cotton	
							Fibre	Seed
	million tons	*million bu.*	*million bu.*	*million bu.*	*million bu.*	*million lbs.*	*million bales*	*thousand tons*
1909	92.76	2572	1068	188.0	35.41	949.4	10.00	4462
1910	82.53	2886	1186	173.8	34.90	1103.4	11.61	5175
1911	67.08	2531	922	160.2	33.12	905.1	15.69	6997
1912	90.73	3125	1418	223.8	35.66	962.9	13.70	6104
1913	79.18	2447	1122	178.2	41.38	953.7	14.16	6305
1914	88.69	2673	1141	195.0	42.78	1034.7	16.14	7186
1915	107.26	2995	1549	228.9	54.05	1062.2	11.19	4992
1916	110.99	2567	1252	182.3	48.86	1153.3	11.45	5113
1917	98.44	3065	1593	211.8	62.93	1249.3	11.30	5040
1918	91.14	2503	1538	256.2	91.04	1439.1	12.04	5360
1919	104.76	2811	1184	147.6	75.48	1465.5	11.42	5074
1920	105.32	3209	1496	189.3	60.49	1582.2	13.44	5970
1921	96.80	3080	1061	151.2	57.92	1117.7	8.34	3704

SOURCES: Cottonseed figures for 1909–18 were taken from the Bureau of the Census Bulletin No. 147, *Cotton Production and Distribution*; 1919–21 data from the *Monthly Crop Reporter*, December, 1921.

TABLE L.—RELATIVE ANNUAL PHYSICAL PRODUCTION OF AGRICULTURAL PRODUCTS, 1909–21—CROPS (Continued)

(*Average of 1919 and 1920 = 100. Unit: one per cent*)

Year	Hay	Corn	Oats	Barley	Rye	Tobacco	Cotton	
							Fibre	Seed
Base:	*million tons*	*million bu.*	*million bu.*	*million bu.*	*million bu.*	*million lbs.*	*million bales*	*thousand tons*
1919–20 (average)	105.0	3010	1340	168.4	67.98	1523.8	12.43	5522
1909	88.3	85.5	79.7	111.6	52.1	62.3	80.4	80.8
1910	78.6	95.9	88.5	103.2	51.3	72.4	93.4	93.7
1911	63.9	84.1	68.8	95.1	48.7	59.4	126.2	126.7
1912	86.4	103.8	105.8	132.9	52.5	63.2	110.2	110.5
1913	75.4	81.3	83.7	105.8	60.9	62.6	113.9	114.2
1914	84.4	88.8	85.2	115.8	62.9	67.9	129.8	130.1
1915	102.2	99.5	115.6	135.9	79.5	69.7	90.0	90.4
1916	105.7	85.3	93.4	108.2	71.9	75.7	92.1	92.6
1917	93.7	101.8	118.9	125.8	92.6	82.0	90.9	91.3
1918	86.8	83.2	114.8	152.1	133.9	94.4	96.9	97.1
1919	99.8	93.4	88.4	87.6	111.0	96.2	91.9	91.9
1920	100.3	106.6	111.6	112.4	89.0	103.8	108.1	108.1
1921	92.2	102.4	79.2	89.8	85.2	73.4	67.1	67.1

Table M. — Annual Physical Production of Animal Products, 1909–21

Year	Cattle	Calves	Milk	Hogs	Sheep	Wool	Poultry	Eggs
	thousands	*thousands*	*million gals.*	*thousands*	*thousands*	*million lbs.*	*millions*	*million doz.*
1909	7714	2189	....	31395	11350	328.1	....	....
1910	7808	2239	....	26003	11408	321.4	....	....
1911	7621	2181	....	34133	14020	318.6	....	....
1912	7253	2278	....	33052	14980	304.0	....	....
1913	6978	1903	....	34154	14405	296.2	....	....
1914	6755	1696	9332	32533	14229	290.2	544	1774
1915	7152	1818	9568	38382	12212	285.7	556	1811
1916	8310	2366	9949	43074	11941	288.5	567	1848
1917	10350	3142	10629	33911	9344	281.9	578	1884
1918	11829	3456	11044	41213	10320	298.9	589	1921
1919	10091	3969	10535	41812	12691	313.6	600	1957
1920	8607	4060	10425	38021	10981	308.5	514	1718
1921	7598	3808	11710	38981	13004	273.1	550	1843

Sources: Data for cattle, calves, hogs and sheep for 1909–10 were furnished by the Bureau of Animal Industry; 1911–18 figures were taken from S. Chase's *Production of Meat in U. S.*; 1919–21 data from the *Federal Reserve Bulletins* and reports of the Department of Agriculture, the *Monthly Crop Reporter* and *Weather, Crops and Markets.* Data for milk, eggs and poultry were obtained from issues of the Yearbooks of the Department of Agriculture, *Weather, Crops and Markets* and data furnished by the Bureau of Agricultural Economics, Department of Agriculture. Wool figures for 1909–13 were obtained from reports of the National Wool Association; 1914–20 data from reports of the Department of Agriculture; the 1921 figure from the National Wool Association Annual Report.

Table N. — Relative Annual Physical Production of Animal Products, 1909–21

(*1919 = 100. Unit: one per cent*)

Year	Cattle	Calves	Milk	Hogs	Sheep	Wool	Poultry	Eggs
	thousands	*thousands*	*million gals.*	*thousands*	*thousands*	*million lbs.*	*million*	*million doz.*
Base: 1919	10091	3969	10535	41812	12691	313.6	600	1957
1909	76.4	55.1	....	75.1	89.4	104.6	....	....
1910	77.4	56.4	....	62.2	89.9	102.5	....	....
1911	75.5	54.9	....	81.6	110.5	101.6	....	....
1912	71.9	57.4	....	79.0	118.0	96.9	....	....
1913	69.2	47.9	....	81.7	113.5	94.5	....	....
1914	66.9	42.7	88.6	77.8	112.1	92.5	90.7	90.6
1915	70.9	45.8	90.8	91.8	96.2	91.1	92.7	92.5
1916	82.4	59.6	94.4	103.0	94.1	92.0	94.5	94.4
1917	102.6	79.1	100.9	81.1	73.6	89.9	96.3	96.3
1918	117.2	87.0	104.8	98.6	81.3	95.3	98.2	98.2
1919	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1920	85.3	102.3	99.0	90.9	86.5	98.4	85.7	87.8
1921	75.3	95.9	111.1	93.2	102.5	87.1	91.7	94.2

TABLE O. — ANNUAL PHYSICAL PRODUCTION OF MINERAL PRODUCTS, 1909–21 — METALS

Year	Iron	Copper	Zinc	Lead	Bauxite	Gold	Silver	Platinum
	mill. long tons	*million lbs.*	*thous. sh. tons*	*thous. sh. tons*	*thous. long tons*	*thous. troy oz.*	*mill. troy oz.*	*hundr. troy oz.*
1909	51.16	1093	230.2	353	129.1	4822	54.72	6.4
1910	56.89	1080	252.5	375	148.9	4657	57.14	7.7
1911	41.09	1097	271.6	392	155.6	4687	60.40	9.4
1912	57.02	1243	323.9	393	159.9	4521	63.77	10.1
1913	59.64	1224	337.3	412	210.2	4300	66.80	10.3
1914	39.71	1150	343.4	513	219.3	4573	72.46	34.3
1915	55.49	1388	458.1	507	297.0	4888	74.96	65.0
1916	77.87	1928	564.3	552	425.1	4479	74.42	245.2
1917	75.57	1886	584.6	548	568.7	4051	71.74	330.1
1918	72.02	1909	492.4	540	605.7	3321	67.81	544.0
1919	56.37	1286	452.3	424	376.6	2919	56.68	402.2
1920	69.28	1209	450.0	477	521.3	2395	56.56	360.2
1921	27.01	461	194.0	390	139.6	2300	50.00	517.9

SOURCES: Iron ore and bauxite data were obtained from reports of the U. S. Geological Survey, *Mineral Resources* and preliminary mimeograph reports. Platinum figures for 1909–18 were taken from the *Mines Handbook* 1918, and later figures from reports of the U. S. Geological Survey.

TABLE P. — RELATIVE ANNUAL PHYSICAL PRODUCTION OF MINERAL PRODUCTS, 1909–21 — METALS

(1919 = 100. Unit: one per cent)

Year	Iron	Copper	Zinc	Lead	Bauxite	Gold	Silver	Platinum
	million gr. tons	*million lbs.*	*thous. sh. tons*	*thous. sh. tons*	*thous. long tons*	*thous. troy oz.*	*mill. troy oz.*	*hundr. troy oz.*
Base: 1919	56.37	1286	452.3	424	376.6	2919	56.68	402.2
1909	90.8	85.1	50.9	83.3	34.3	165.2	96.5	1.6
1910	100.9	84.0	55.8	88.4	39.6	159.5	100.8	1.9
1911	72.9	85.3	60.0	92.5	41.3	160.6	106.5	2.3
1912	101.2	96.7	71.6	92.7	42.5	154.9	112.5	2.5
1913	105.8	95.2	74.6	97.2	55.8	147.3	117.8	2.6
1914	70.4	89.4	75.9	121.0	58.2	156.6	127.8	8.6
1915	98.4	107.9	101.3	119.6	78.8	167.4	132.2	16.1
1916	138.1	149.9	124.7	130.2	112.8	153.4	131.3	61.0
1917	134.0	146.6	129.2	129.2	151.0	138.8	126.6	82.0
1918	127.8	148.4	108.8	127.3	160.8	113.8	119.6	135.1
1919	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1920	122.9	94.0	99.5	112.5	138.4	82.0	99.8	89.6
1921	47.9	35.8	42.9	92.0	37.1	78.8	88.2	128.8

TABLE Q. — ANNUAL PHYSICAL PRODUCTION OF MINERAL PRODUCTS, 1909–21 — NON-METALS

Year	Bituminous coal	Anthracite	Petroleum	Natural gas	Stone	Sand	Cement	Lime
	million sh. tons	*million sh. tons*	*million bbls.*	*mill. M cu. ft.*	*million sh. tons*	*million sh. tons*	*million bbls.*	*thous. sh. tons*
1909	379.7	81.07	183.2	....	....	59.57	64.99	3485
1910	417.1	84.49	209.6	....	....	69.41	76.55	3506
1911	405.9	90.46	220.4	513.0	....	66.85	78.53	3393
1912	450.1	84.36	222.9	562.2	....	68.35	82.44	3529
1913	478.4	91.52	248.4	581.9	....	79.56	92.10	3595
1914	422.7	90.82	265.8	591.9	....	79.28	88.23	3381
1915	442.6	89.00	281.1	628.6	....	76.60	85.92	3623
1916	502.5	87.58	300.8	753.2	91.83	89.09	91.52	4073
1917	551.8	99.61	335.3	795.1	83.57	76.42	92.81	3786
1918	579.4	98.83	355.9	721.0	68.56	61.82	71.08	3206
1919	458.1	88.09	377.7	735.0	65.54	70.58	80.78	3330
1920	556.6	89.10	443.4	860.0	78.53	82.04	100.02	3570
1921	407.0	87.50	469.6	807.7	62.40	....	98.29	....

SOURCES: Natural gas, stone, sand, cement and lime figures were taken from reports of the U. S. Geological Survey and *Mineral Resources;* current figures from preliminary mimeograph reports.

TABLE R. — RELATIVE ANNUAL PHYSICAL PRODUCTION OF MINERAL PRODUCTS, 1909–21 — NON-METALS

(1919 = 100. Unit: one per cent)

Year	Bituminous coal	Anthracite	Petroleum	Natural gas	Stone	Sand	Cement	Lime
	million sh. tons	*million sh. tons*	*million bbls.*	*mill. M cu. ft.*	*million sh. tons*	*million sh. tons*	*million bbls.*	*thous. sh. tons*
Base: 1919	458.1	88.09	377.7	735.0	65.54	70.58	80.78	3330
1909	82.9	92.0	48.5	....	....	84.4	80.4	104.6
1910	91.0	95.9	55.5	....	....	98.3	94.8	105.3
1911	88.6	102.7	58.3	69.8	....	94.7	97.2	101.9
1912	98.2	95.8	59.0	76.5	....	96.8	102.0	106.0
1913	104.4	103.9	65.8	79.2	....	112.7	114.0	107.9
1914	92.2	103.1	70.4	80.5	....	112.3	109.2	101.5
1915	96.6	101.0	74.4	85.5	....	108.5	106.3	108.8
1916	109.7	99.4	79.6	102.5	140.1	126.2	113.3	122.3
1917	120.4	113.1	88.8	108.2	127.5	108.3	114.9	113.7
1918	126.4	112.2	94.2	98.1	104.6	87.6	88.0	96.3
1919	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1920	121.5	101.1	117.4	117.0	119.8	116.2	123.8	107.2
1921	88.8	99.3	124.3	109.8	95.2	....	121.6	....